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TETRAMORIUM CAESPITUM (LINNAEUS) AND *LIOMETOPUM LUCTUOSUM* W. M. WHEELER (HYMENOPTERA: FORMICIDAE): NEW STATE RECORDS FOR IDAHO AND OREGON, WITH NOTES ON THEIR NATURAL HISTORY

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Abstract.—The pavement ant, *Tetramorium caespitum* (L.) (Hymenoptera, Formicidae, Myrmecinae) is reported from Idaho for the first time with additional records given for Oregon. *Tetramorium caespitum* was found almost exclusively in urban or disturbed environments. The ants were observed gnawing through wheat stems and leaves to obtain Russian Wheat Aphids which they carried back to their nest. *Tetramorium caespitum* has replaced *Lasius neoniger* Emery in at least two instances in southern Idaho. *Liometopum luctuosum* W. M. Wheeler (Hymenoptera, Formicidae, Dolichoderinae) is reported from Idaho and represents a new Pacific Northwest record. *Liometopum luctuosum* collections were made from inside buildings and houses in northern Idaho and from a rangeland area in south central Idaho.

Key Words.—Insecta, Formicidae, *Tetramorium caespitum, Liometopum luctuosum, Diuraphis noxia,* Idaho, Oregon, pest ants

The pavement ant, *Tetramorium caespitum* (L.), is an introduced species that is widespread over much of Europe, Asia and Africa. In the United States, it is found in most states from the Atlantic seaboard to the Mississippi Valley (Creighton 1950) and has been reported in the west from Utah (Allred 1982), Nevada (Wheeler & Wheeler 1986), California (Cook 1953, Knight & Rust 1990), and Washington (Krombein et al. 1979; Schultz 1980, 1982); it was not surprising to find it in either Idaho or Oregon. *Liometopum luctuosum* W. M. Wheeler is a native species ranging from Wyoming, Colorado, west Texas and Arizona to California (Krombein et al. 1979) and Nevada (Wheeler & Wheeler 1986). Idaho can now be added to its known distribution and this represents the first record of this ant in the Pacific Northwest.

This paper reports both the distribution and habits of these ants in Idaho. With the addition of these two species, Idaho is home to 125 species of ants (Yensen et al. 1977).

MATERIALS AND METHODS

The ant distributions reported here are from collections made by the authors, extension personnel, and pest control officials. Voucher specimens of *T. caespitum* and *L. luctuosum* have been deposited in the William F. Barr Entomological Museum, University of Idaho, Moscow (WFBM) and the Orma J. Smith Museum of Natural History, Albertson College of Idaho, Caldwell (CIDA). Samples of fragment piles found in houses infested with *L. luctuosum* were examined with an Amray Model 1830 Scanning Electron Microscope to determine if the ants

had excavated wood or some other material. An opportunity to record pavement ant predation on the Russian Wheat Aphid (RWA), *Diuraphis noxia* (Mordvilko) occurred during the summer of 1990 at the Manis Greenhouse Laboratory of the University of Idaho.

Results and Discussion

Tetramorium caespitum

The keys and discussion in Wheeler & Wheeler (1986) provide an adequate account of the appearance of the pavement ant. This is a moderately small ant (workers 2.5–3.0 mm); body color ranges from brown to dark red-brown to nearly black. Other characteristics useful for identification of this ant include: Myrmecinae, body covered with coarse hairs, antennae with 3-segmented club, clypeus forming ridge in front of antennae fossa, propodeum with short spines, and femora enlarged.

Distribution.—The first record of *T. caespitum* in Idaho was from museum specimens in the WFBM collected in Lewiston, Nez Perce Co., on 20 Apr 1979. Lewiston is an ideal location for the introduction of a species into Idaho because it is an inland seaport connected to Portland via the Snake and Columbia Rivers, is the lowest elevation (226 m) in the state, and has a mild climate. Over the past several years we have made numerous collections and observations of the species in Idaho (Fig. 1) (Table 1). To date, *T. caespitum* has been collected in Ada, Bonneville, Canyon, Elmore, Gooding, Idaho, and Latah Counties (Fig. 1). Schultz (unpublished data) mentions the pavement ant as occurring sporadically in northeastern Oregon though no other information is given. Our collection records and those provided by Daniel Hilburn (Oregon Department of Agriculture) indicate that *T. caespitum* occurs in nearly all metropolitan areas in Oregon (Table 1).

Observations.—Based on surveys by Yensen et al. (1977) and recency of the first collection of *T. caespitum* in Idaho, it is evident that this species has rapidly expanded its range. All, except one, of our Idaho collections have been from disturbed or protected situations such as sidewalks, along foundations, and in structures. This is in contrast to areas in eastern North America and California where colonies are commonly found nesting in open areas without the aid of covering objects (Bruder & Gupta 1972, Reil et al. 1982). Of the nine collections in Latah, Nez Perce and Idaho Counties, four were of stray workers in buildings, one was foraging workers in a greenhouse and three were associated with concrete slabs. A single collection of workers moving in and out of 75.2 mm–101.6 mm × 25.4 mm crater nests in Orofino, Idaho is the only example of open nesting. Of the 18 collections in southern Idaho, 13 were in and around building foundations, and five were associated with concrete slabs. The remainder were either single collections of alate females or had no definite information associated with them. One collection was made from a partly rotten cottonwood (*Populus*) log.

Numerous referrals from pest control officers and other professionals in Idaho indicate that the pavement ant is now a significant urban pest. Reports over the last two years most commonly concern messy earthworks on sidewalks, driveways, and other outdoor structures. Workers are frequently found in large numbers around garbage cans and rotting fruit such as apples under trees. Reil et al. (1982) reported *T. caespitum* as a pest in almond orchards in California where workers

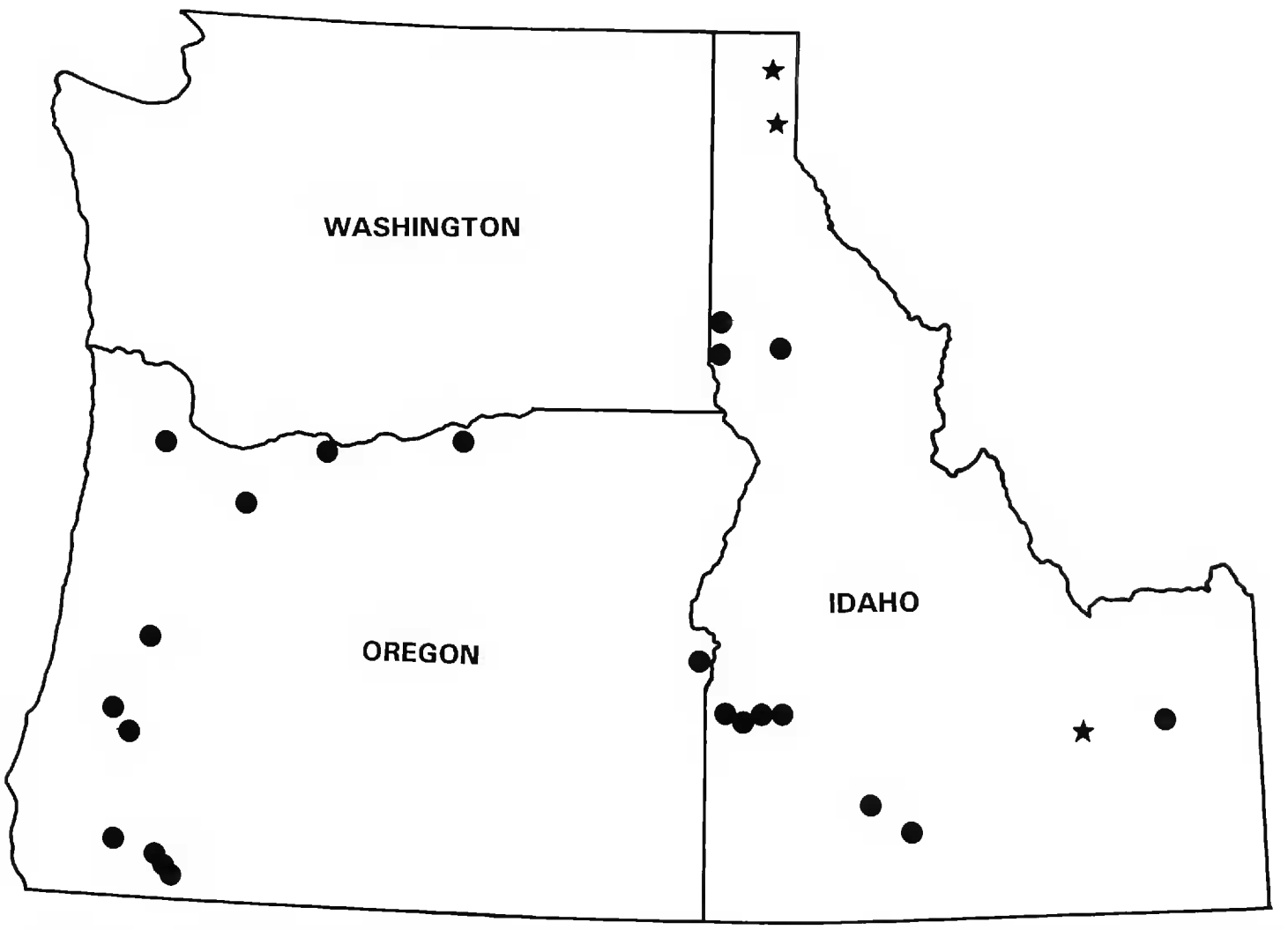


Figure 1. Distribution of *Tetramorium caespitum* in Idaho and Oregon and *Liometopum luctuosum* in Idaho.

would chew into the inner kernel of almonds on the ground. Young mint plants in Idaho were damaged by workers chewing on both stems and roots (Craig Baird, personal communication). Several reports of workers foraging inside structures such as basements, around pet food, and in greenhouses indicate its potential as a household pest.

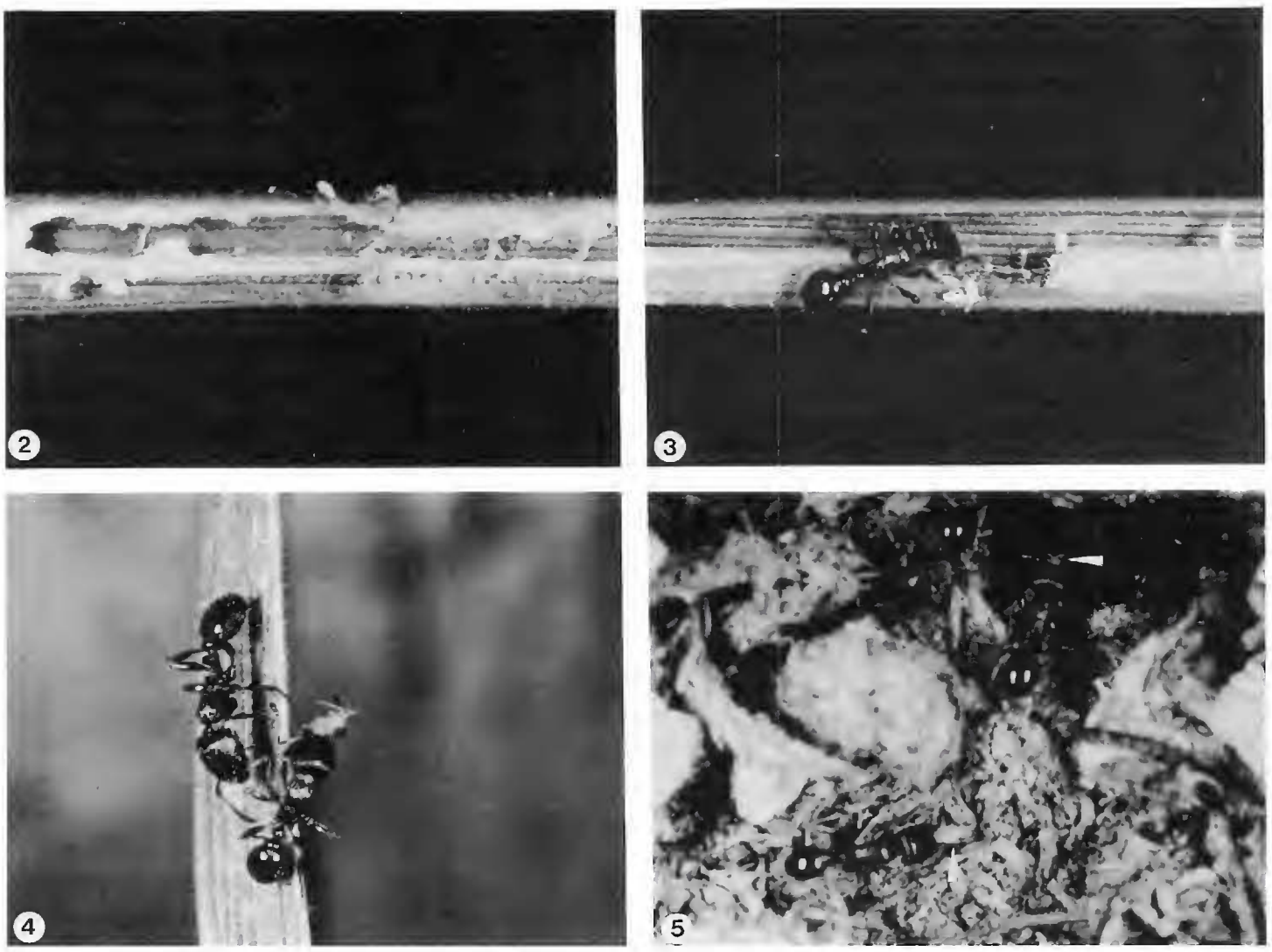
Predation.—The pavement ant has attracted attention as a household, greenhouse and nursery pest. Described as being omnivorous (Smith 1965, Wheeler & Wheeler 1986), there have been few direct observations of pavement ants preying on other insects. Soil dropping by pavement ants as a means of overcoming the ground nesting Alkali Bee, *Nomia melanderi* Cockerell (Schultz 1982) represents a fascinating behavior for subduing prey that are much larger in size than the ant. A greenhouse research colony of RWAs maintained on wheat was devastated by pavement ants in three days. The ants aggressively gnawed through leaves and stems to get at aphids (Figs. 2–3). Aphids were not tended by the ants but carried back to the colony (Fig. 4). Examination of the aphids carried by the ants (Fig. 5) just prior to entering the colony indicated they were still alive. Whether the aphids were to be tended within the colony or directly consumed is unknown. It was estimated that several grams of RWAs were carried away by the ants.

As *T. caespitum* becomes better established in Idaho, it should prove interesting to follow colony development. Observations of *T. caespitum* occupying two former nest sites of *Lasius neoniger* Emery along a sidewalk and a concrete step/foundation joint indicate that it has the capability to displace native ant species. This

Table 1. Collection records for *Tetramorium caespitum* in Oregon and Idaho.

Location	Date	Situation
Oregon records		
Clackamas Co., Clackamas	IX-19-1990	workers in warehouse
Douglas Co., 15 mi. W Sutherlin	IV-6-1984	workers in house
Douglas Co., Roseburg	IX-9-1991	
Jackson Co., Phoenix truck stop	VII-24-1991	workers at baits
Jackson Co., Medford Vis Info Center	VII-24-1991	
Jackson Co., Talent Linn Newberry Pk.	VII-22-1991	
Josephine Co., Grantspass car lot	VII-29-1991	
Lane Co., Eugene rest stop on Hwy. 99	X-24-1991	
Malheur Co., Ontario cemetery	V-26-1991	at edge of pavement
Morrow Co., Boardman Rest Area	X-7-1990	cracks in sidewalk
Wascoe Co., Memaloose State Park	X-4-1990	
Washington Co., Portland, moving company	IX-19-1990	
Washington Co., Tualatin, nursery	IX-19-1990	
Idaho records		
Ada Co., Boise	V-1-1988	workers along sidewalk
Ada Co., Boise	VI-14-1988	workers and alates swarming
Ada Co., Boise	VIII-10-1988	PCO[a] referral—workers around building
Ada Co., Boise	IX-25-1988	PCO referral (2 samples) around building
Ada Co., Boise	III-12-1989	sidewalk
Ada Co., Boise	IV-2-1989	cracks in driveway
Ada Co., Boise	IV-15-1989	under concrete slab
Ada Co., Boise	IV-13-1989	workers & 1 alate female
Ada Co., Boise	IV-13-1989	alate females
Ada Co., Boise	VII-28-1990	workers in cracks in driveway
Ada Co., Boise	V-31-1991	nesting in cottonwood logs
Ada Co., Boise	VIII-6-1990	workers on sidewalk
Ada Co., Meridian		
Bonneville Co., Idaho Falls	V-22-1990	in motel bathroom
Canyon Co., Caldwell	VIII-8-1988	pest around garage & sprayed for control
Canyon Co., Caldwell	V-12-1989	along sidewalks and curbs
Canyon Co., East of Nampa	VIII-10-1990	cracks in driveway
Clearwater Co., Orofino Airport	1988	workers open nesting
Elmore Co., Glennsferry	VII-21-1990	along sidewalk cracks
Gooding Co., Hagerman	V-27-1989	along sidewalk cracks
Latah Co., Moscow	I-5-1988	workers in basement
Latah Co., Moscow	IV-1988	workers in building
Latah Co., Moscow	VII-13-1988	workers on sidewalk
Latah Co., Moscow	V-29-1989	workers in basement
Latah Co., Moscow	1989	workers in greenhouse
Nez Perce Co., Lewiston	IV-20-1979	workers, alate queens
Nez Perce Co., Lewiston	1989	workers

[a] PCO = Pest Control Official.



Figures 2–5. Figure 2. Shoot of young wheat plant cut open by *Tetramorium caespitum* to capture aphids. Figure 3. *Tetramorium caespitum* cutting into wheat shoot to obtain aphids. Figure 4. *Tetramorium caespitum* on wheat shoot carrying russian wheat aphid. Figure 5. *Tetramorium caespitum* returning to nest entrance. Two *Tetramorium caespitum* workers (white arrows) are carrying aphids.

is not surprising as many of the characteristics of successful invaders possessed by red imported fire ant, *Solenopsis invicta* Buren (Porter & Savignano 1990), are also possessed by the pavement ant: i.e., a preference for heavily disturbed areas associated with human activity, toleration of a wide range of climatic conditions, utilization of a diversity of food resources, and high reproductive capacity. Enormous aggregations of thousands of workers on sidewalks, thought to be the result of territorial battles between adjacent colonies, testifies to the potentially large colony size.

Liometopum luctuosum

Liometopum luctuosum may be separated from other Dolichoderinaes and species of *Liometopum* by the keys and discussion in Wheeler & Wheeler (1986). Superficially, *L. luctuosum* can be confused with *Tapinoma sessile* (Say), another Dolichoderinae species which is very common and also enters houses. Size can help in separating these two ants, *L. luctuosum* (2.5 mm–4.5 mm) being larger than *T. sessile* (1.5 mm–3 mm) (Wheeler & Wheeler 1973). Additionally, *L. luctuosum* is a moderately polymorphic ant with a series of specimens usually represented by both small and large workers. *Tapinoma sessile* workers tend to

Table 2. Collection records for *Liometopum luctuosum* in Idaho.

Location	Date	Situation
Bonner Co., Hope	VIII-28-1991	workers in cabin
Bonner Co., Hope	VIII-25-1992	workers foraging up porch beam and at base of and up trunk of ponderosa pine
Boundary Co., Bonners Ferry	VIII-20-1991	workers in house
Boundary Co., Bonners Ferry	VIII-1991	workers in building
Butte Co., Idaho National Engineering Laboratory, Middle Butte	VI-24-1989	workers foraging on and near juniper

be more uniform in size. Both species possess the characteristic dolichoderine odor that frequently signals their presence before workers are observed.

Distribution.—The first records of *L. luctuosum* in Idaho are from household infestations in Bonners Ferry, Boundary Co., observed in the early 1980s (P. Allegretti, personnal communication) (Fig. 1). Possible confusion with *T. sessile* and the anomalous occurrence of infestations delayed identification of this ant until recently. One additional record from the Top of Middle Butte, elev. approximately 1859 m, in the Idaho National Engineering Laboratory (INEL), Butte Co., represents the only other collection of *L. luctuosum* in Idaho (W. H. Clark #8787 and P. E. Blom #6734) (Table 2).

Observations.—The nesting habits of our three North American species of *Liometopum* are poorly known. Much of the known information concerns *L. apiculatum* though few colonies have ever been found, much less excavated. Colonies of both *L. luctuosum* and *L. apiculatum* are notorious for their obscurity despite being frequently very large. Most observations record workers disappearing into rocks, roots of trees, or going up tree trunks where they enter tree holes. Less frequent are reports of workers entering houses where they either forage for food (Roy Snelling, personnal communication) or live. Reports of piles of fine sawdust and in at least one circumstance workers damaging plasterboard (Wheeler & Wheeler 1986) indicate the potential for *L. luctuosum* to be a household pest.

Nest chambers of both *L. luctuosum* and *L. apiculatum* are composed at least in part of a paper-like or spongiform material called "carton" that is thought to be produced by the ants mixing pieces of plant material and soil with a secretion that cements the mass together (Creighton 1950, Gregg 1963, Wheeler & Wheeler 1986). Within this matrix or "trabiculae" the ants maintain their brood chambers.

The few published observations on the feeding habits of our species of *Liometopum* indicate they are omniverous (Gregg 1963). Van Pelt (1971) noted that *L. apiculatum* actively tended membracids and aphids. In the same study workers of *Pogonomyrmex barbatus* (F. Smith), *Camponotus sayi* Emery and *Solenopsis xyloni* McCook were stopped by workers of *L. apiculatum* which solicited food from them. Foraging trails of *C. sayi* and *S. xyloni* were also utilized by the *Liometopum* workers in order to affect feeding exchanges or trophobioses.

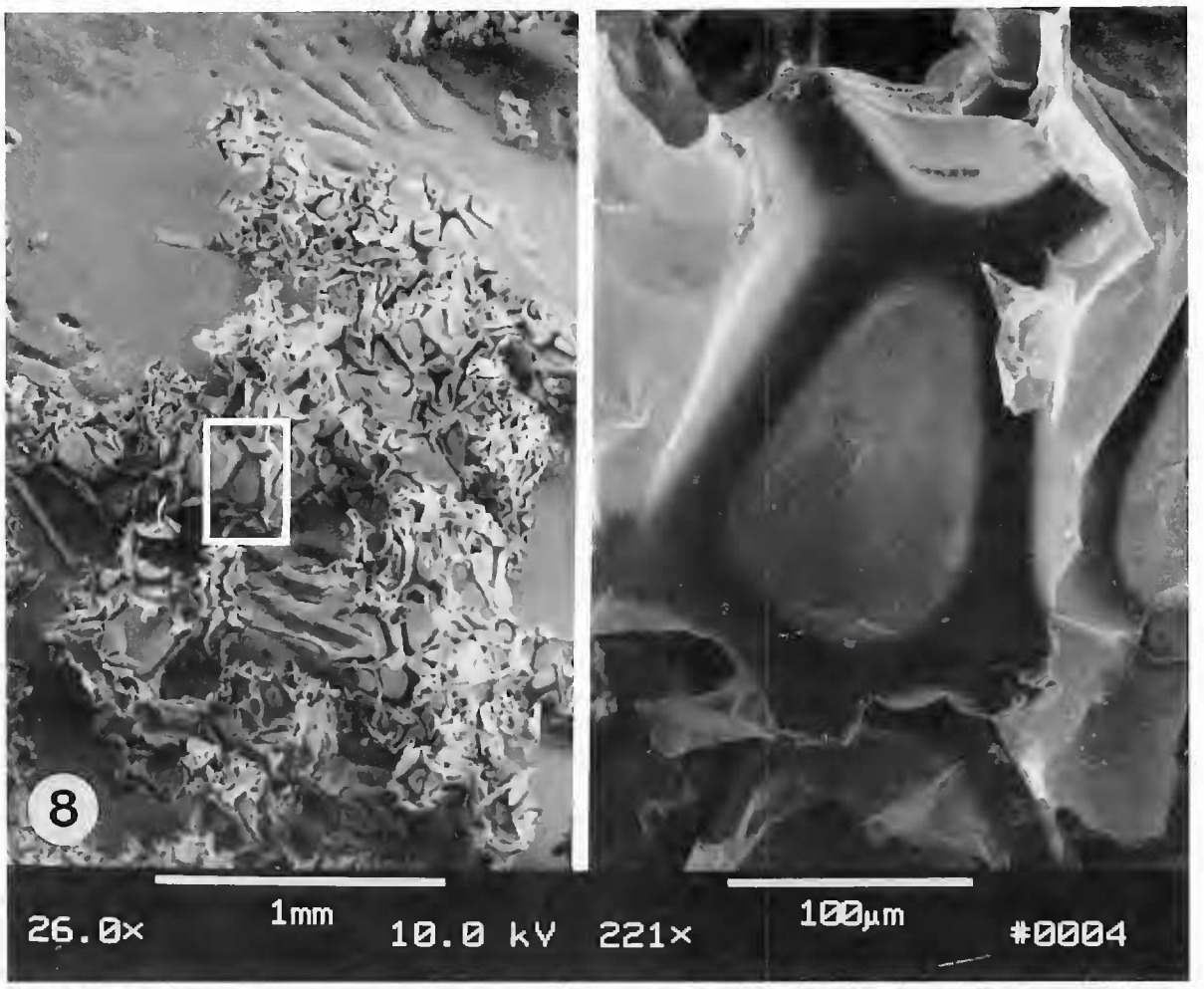
Homeowner calls and pest control reports during 1990 and 1991 in north Idaho frequently expressed concern not only with worker ants within houses but also with "piles of fine sawdust" being seen in various areas of homes. Figure 6 shows

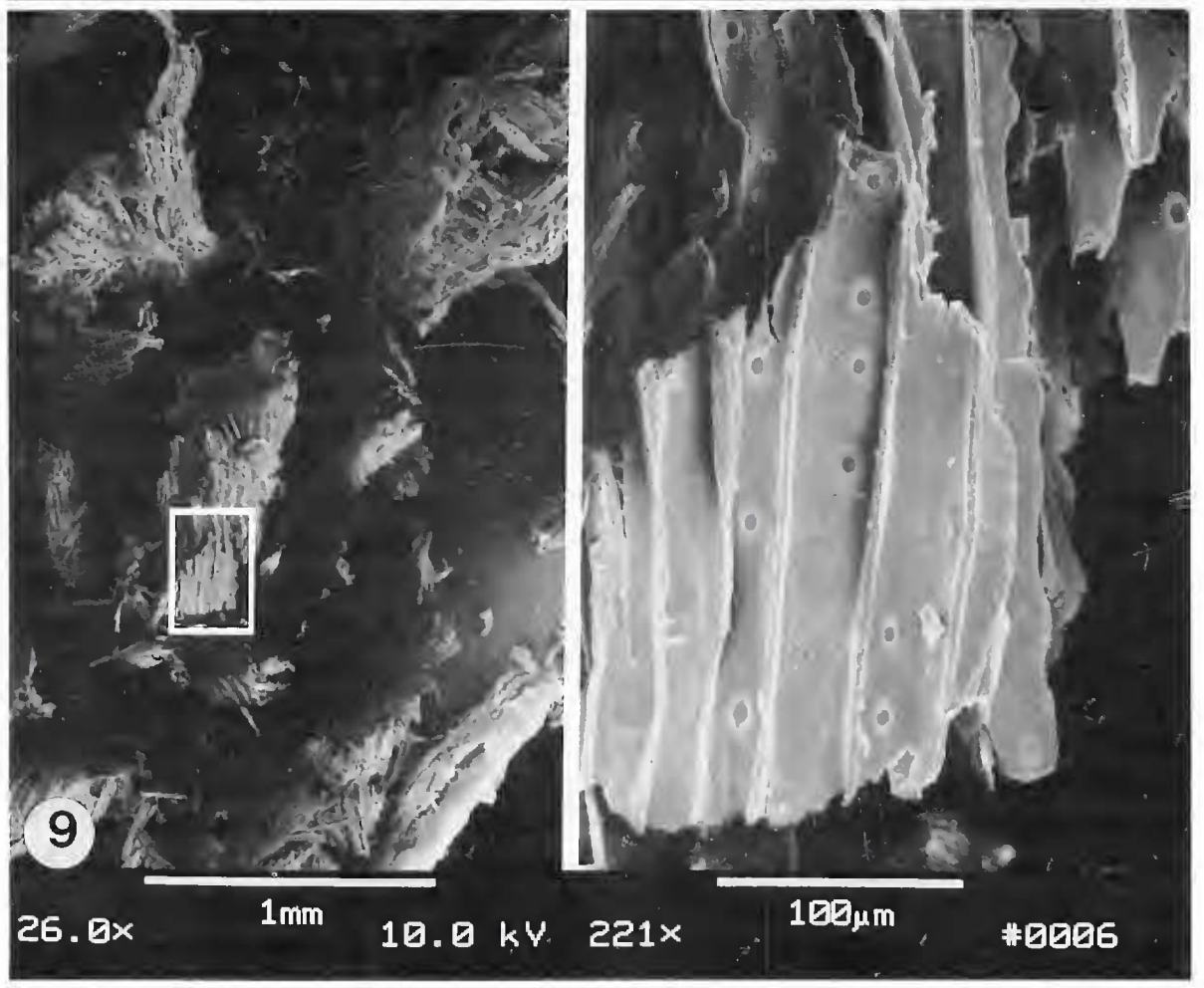
Figure 6. Pile of refrigerator insulation fragments (arrow) produced by *L. luctuosum* inside a house.

the result of one such infestation within a house near Hope, Idaho. In this particular instance workers were subsequently located entering a hole beneath a branch of a ponderosa pine located 15 m from the house (Fig. 7). In addition to piles of sawdust, homeowners frequently complained of a strong odor variously described as being like "rotting bananas" or just very pungent. The obvious concern was for carpenter ant infestations. Once the ant was identified as being *L. luctuosum* it became intriguing how this ant could be damaging wood structures

Figure 7. Ponderosa pine tree with nest of *Liometopum luctuosum*. Arrow indicates entrance.

in a fashion similar to carpenter ants. A sample of the "sawdust" from one infestation was acquired and initially examined with a light microscope and then subsequently studied with a scanning electron microscope. A comparison between the "sawdust" from the *L. luctuosum* infested home and that from the carpenter ant *Camponotus modoc* Wheeler can be seen in Figs. 8 and 9. *Camponotus modoc* sawdust contained typical xylem elements identifying it as being derived from wood, but the *L. luctuosum* "sawdust" did not. While one might speculate that





Figures 8, 9. Figure 8. SEM of *Liometopum luctuosum* sawdust. Figure 9. SEM of *Camponotus modoc* sawdust.

this material is fragments of carton, a more likely source of the substance is household insulation. This is supported by observations of large congregations of workers, including brood in one instance, under and within subflooring insulation. A large pile of insulation fragments was found beneath the ants and presumed to be the result of the ants enlarging their nest area.

Further study of *L. luctuosum* in northern Idaho is needed to determine whether structural infestations, containing brood, represent established colonies or satellite colonies with the main nest located outside in tree holes or root crowns. Also, the possibility that *L. luctuosum* competes with carpenter ants needs investigation as no infestations in northern Idaho have been found containing both species and they do appear to occupy similar areas within structures. It is important when assessing structural damage that proper identification of both the damage and ant species is made. While excavation of insulation should be of concern to homeowners, it is relatively surficial compared to the damage potential of an established carpenter ant colony. Finally, how this ant has seemingly become so well established outside its previously known distribution is equally intriguing. Whether *L. luctuosum* has spread through natural means or has been introduced could determine how well it will be able to establish itself in this area of the northwest.

Acknowledgment

We express our appreciation to Phil Allegretti for bringing the existence of *Liometopum luctuosum* to our attention and for making numerous observations on its habits in northern Idaho. Dennis Schotzko captured on film all pavement ant-RWA interactions. Franklin Bailey was of indispensible help with SEM photography and identifying the wood fragments. We thank Seth Merickel, Mary Clark, Paul Blom, Keith Miles, Tom Aucutt, and Don Brothers for assistance with field collections. Paul Blom, Malcolm Furniss, and Hugh Homan reviewed early drafts of this manuscript. Daniel Hilburn provided distribution records of pavement ants in Oregon. Craig Baird provided observations of pavement ants attacking mint plants in Idaho. Gratitude is expressed to Roy Snelling for confirming the identity of *L. luctuosum* and providing useful information regarding its biology. The Middle Butte collection was made possible by support from the Idaho National Engineering Laboratory Radioecology and Ecology Program and was sponsored by Environmental Restoration and Waste Management, Idaho Operations Office, United States Department of Energy. Published as Idaho Agriculture Experiment Station paper #92761.

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